

CEMENT AND LIME

~~691.052~~ MANUFACTURE
CS3 THE JOHN CHEMICAL LIBRARY

MAY, 1957 JUN 5 1957

VOL. XXX. No. 3

Price 1s. Annual subscription 6s
(\$1.30 in Canada and U.S.A.)

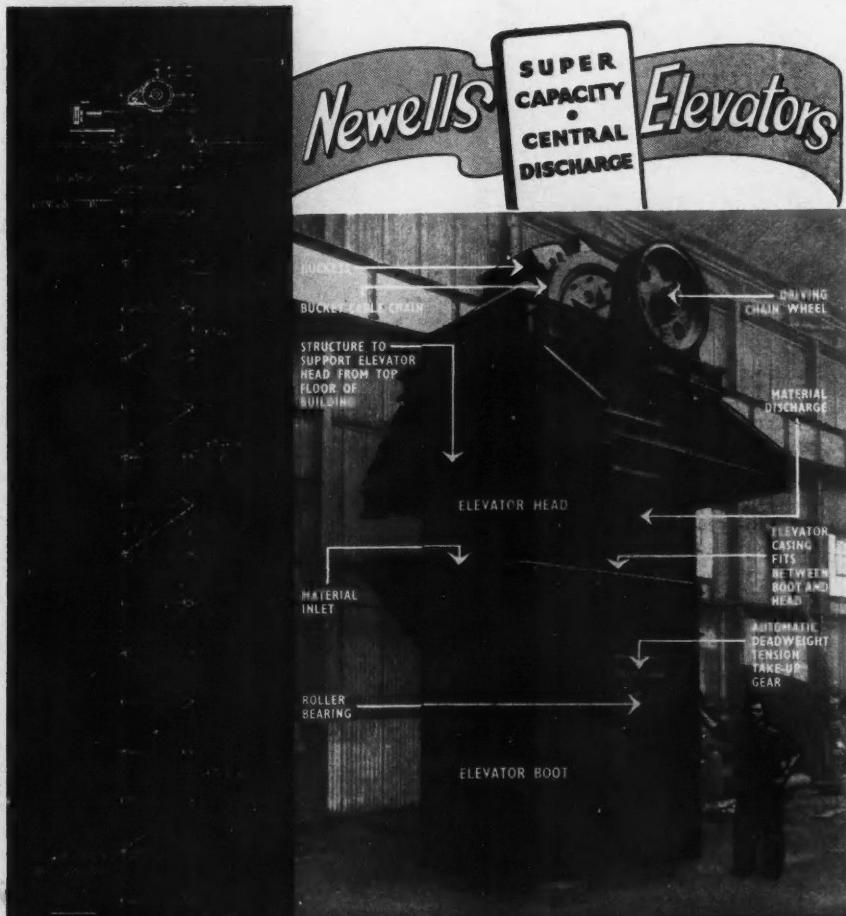


Illustration of Head and Boot of Newells elevators installed at works. Part of plant for drying and handling 250 tons of Fertilizer per hour.

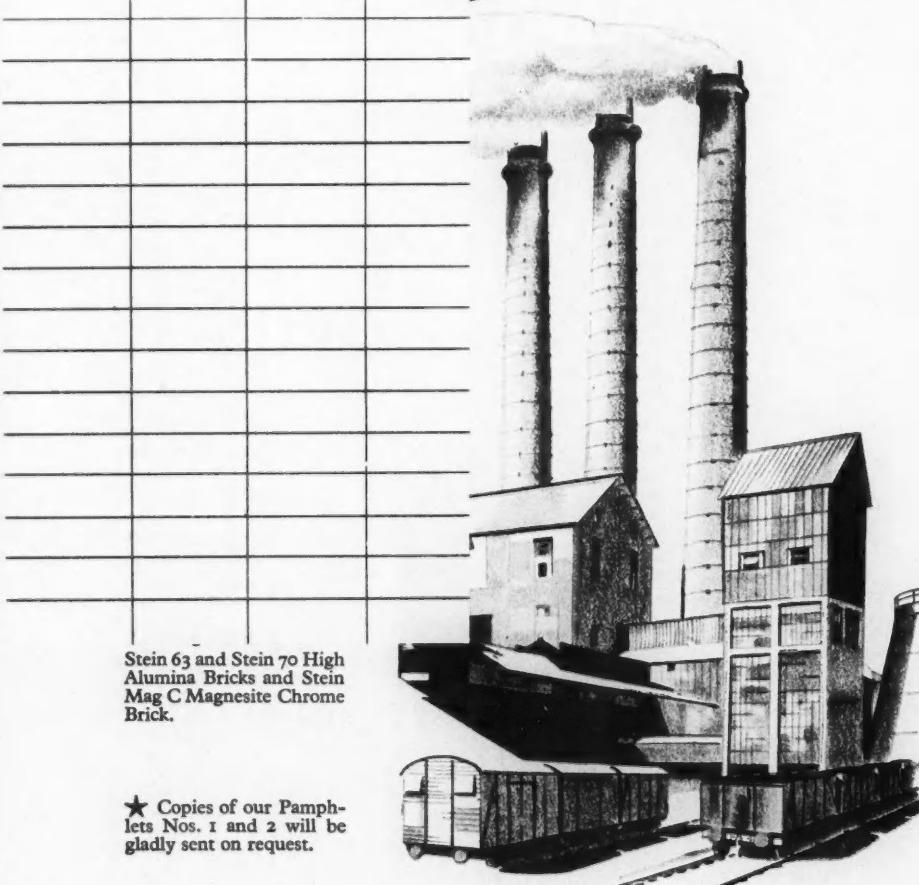
BUILT IN VARIOUS SIZES FOR HANDLING UP TO 250 TONS PER HOUR OF DRY MATERIALS, OR UP TO 300 TONS PER HOUR OF CEMENT SLURRY

Slow Speed . . . Low Power . . . High Capacity

ERNEST NEWELL & CO LTD MISTERTON DONCASTER

DATE DUE**F.61**

ICJ MAY 16 '73

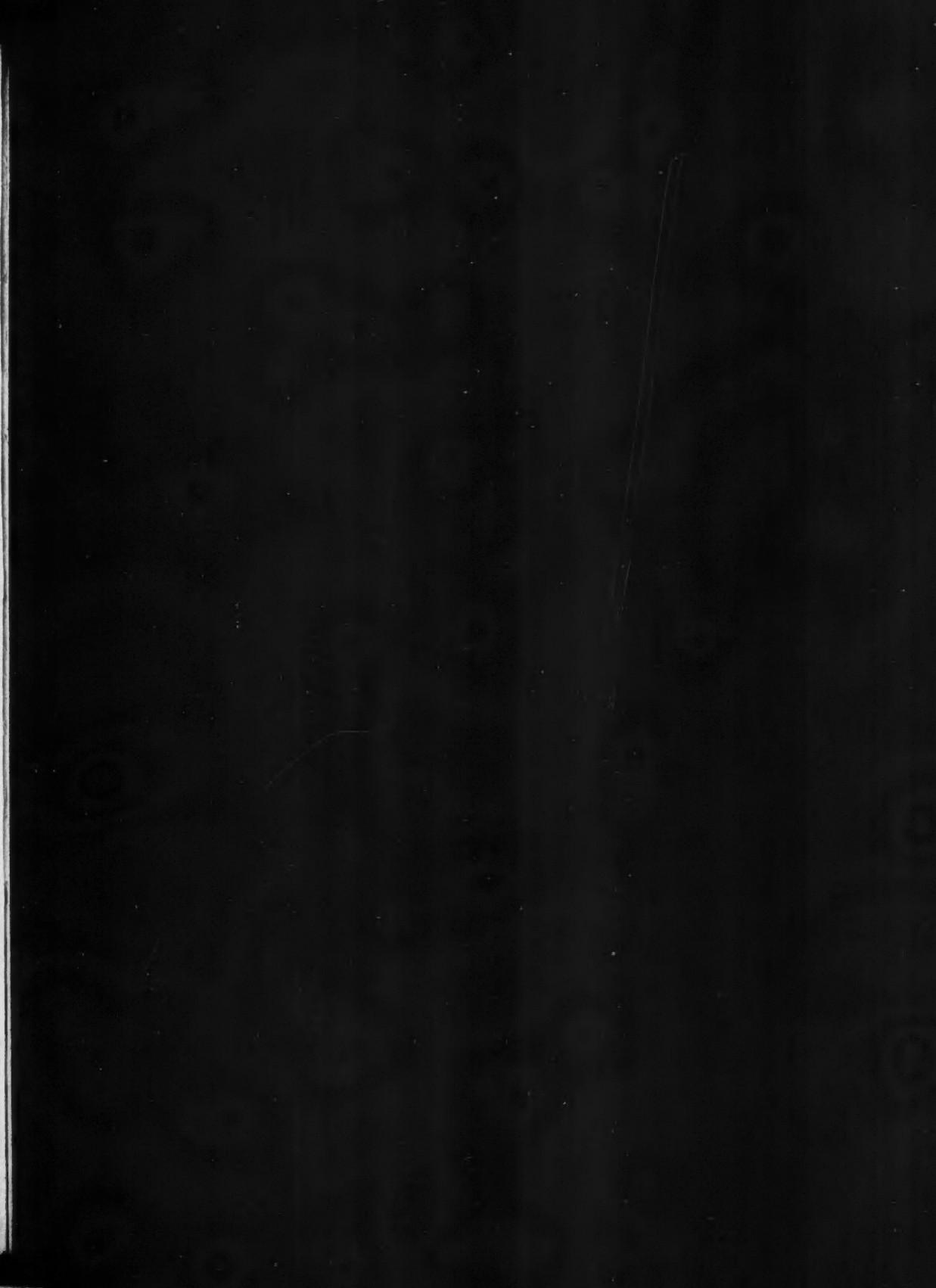
factories

Stein 63 and Stein 70 High
Alumina Bricks and Stein
Mag C Magnesite Chrome
Brick.

★ Copies of our Pamph-
lets Nos. 1 and 2 will be
gladly sent on request.

JOHN G. STEIN & CO. LTD Bonnybridge, Scotland

Telephone: BANKNOCK 255 (4 lines)





THINKING OF CAST GRINDING MEDIA ?

THEN TRY...

PERFECT SHAPE BALLS
AND PELLETS
FREE FROM FINS AND
LARGE RUNNERS

Send for samples to-day

You will be amazed at the quality

HELIPEBS LTD PHONE: GLOUCESTER 24061
GRAMS: HOLBERS, GLOUCESTER
PREMIER WORKS
GLOUCESTER

EAGLE BINDA

SULPHITE LYME POWDER

SPRAY DRIED

CALCIUM LIGNOSULPHONATE

improves the viscosity of
SLURRY
 reduces pumping pressure

Cement manufacturers throughout the world are taking advantage of the economies made possible by using "Eagle Binda," as an additive to the raw mix slurry, which enables a trouble-free pumping of slurry with reduced pressure in the pipeline to be obtained. Stocks of "Eagle Binda" Sulphite Lye Powder, spray dried, Calcium Lignosulphonate, are held for immediate delivery to cement works in any part of the world. Full particulars are available from

Production Chemicals (Rochdale) Ltd.

VICTORIA BUILDINGS, 32 DEANSGATE, MANCHESTER, 3

Telephone : Blackfriars 3396 and 3851.

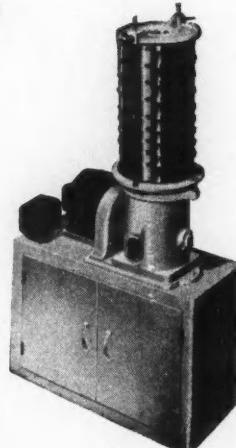
Telegrams : Chemprodux, Manchester.

Int. Telex : 66-330.

accurate particle size analysis

Vibration alone or hand shaking is not sufficient for accurate particle size analysis of materials. Vibration alone is more inclined to aggregate the particles. The Inclyno Test Sieve Shaker ensures perfect segregation of the various particle sizes in the shortest possible time having a double movement of gyrating and jolting the test material.

The Inclyno Test Sieve Shaker is an essential unit for all laboratories and is standard equipment in many government laboratories, nationalized industries and industry in general. Operated by a fractional h.p. motor and supplied complete with automatic time switch covering test periods up to 60 minutes. Models available for all sizes of standard test sieves.



INCLYNO

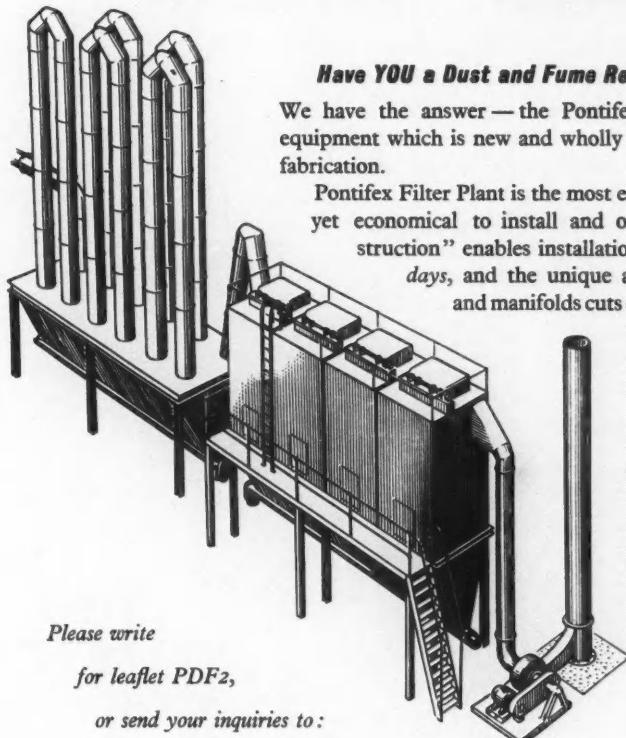
TEST SIEVE SHAKER

Write or telephone Crawley 25166 for List IN 605

THE PASCALL ENGINEERING CO. LTD • GATWICK ROAD • CRAWLEY • SUSSEX

NEW! The Pontifex

fully automatic Filter Plant



Please write

for leaflet PDF2,

or send your inquiries to :

Have YOU a Dust and Fume Recovery problem?

We have the answer — the Pontifex service, employing equipment which is new and wholly British in design and fabrication.

Pontifex Filter Plant is the most efficient on the market, yet economical to install and operate. "Unit Construction" enables installations to be completed in days, and the unique arrangement of valves and manifolds cuts down power consumption

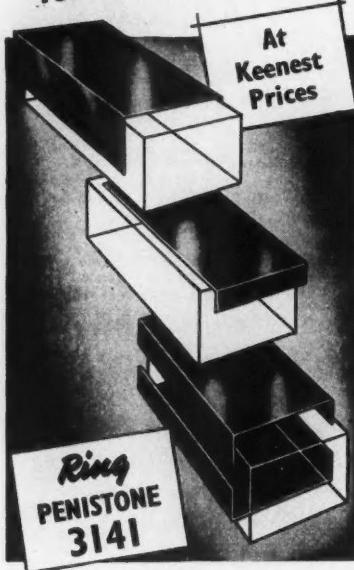
tion. You save in initial cost and in running expenses. A consultation will cost you nothing and carries no obligation. If we can help you, we will design plant to meet your own special needs and circumstances. If, exceptionally, your trouble demands a different remedy, we will advise you frankly and impartially.

PONTIFEX

Established 1788

H. PONTIFEX & SONS, LTD.,
9-13 GEORGE STREET,
MANCHESTER SQUARE, LONDON, W.I.
TELEPHONE: WELBECK 8201 (6 LINES)
WORKS: BIRMINGHAM, LEEDS, LONDON.

STEEL JOINTING SHEETS for BASIC BRICKS



Produced in Sheet Steel in all thicknesses from 21 gauge to $\frac{1}{8}$. For easy handling, all products are packed in bundles of 25 or 50 according to weight, and marked to customer's specification.

**PALLET PLATES
and TAPHOLE TUBES**
to Customer's Specification

SOLE MANUFACTURERS TO THE
CHROME-MAGNESITE BRICKMAKERS ASSOCIATION

**FLOUCH GARAGE and
ENGINEERING COMPANY**

HAZLEHEAD near SHEFFIELD
YORKSHIRE

Alite

SUPER REFRACTORIES for CEMENT & LIME WORKS

High Alumina bricks and special shapes for Rotary and Shaft kilns. Full details available on request.

Alite	Alumina	Refractoriness
No. 1	69-72%	CONE 37-38
B. 1	62-64%	36
B.	57-59%	36
D.	39-42%	33

High-Temperature Insulating Bricks.
"PEER" Air-Setting Refractory
Cements.

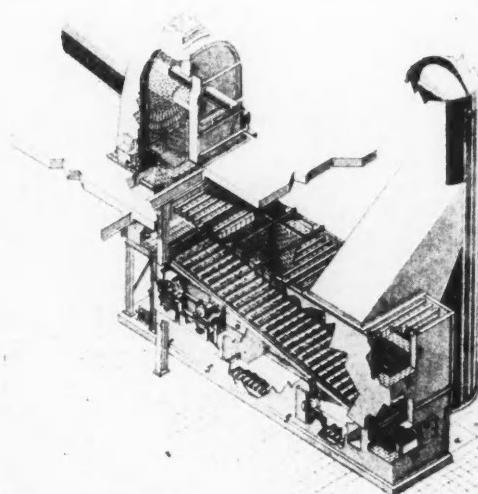
"R" Quality Firebrick for lower
temperature work and resistance to
abrasion.



**E. J. & J. PEARSON LIMITED
STOURBRIDGE, ENGLAND**





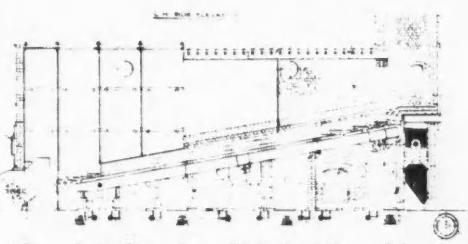


FULLER CLINKER COOLER for efficient cement production

**INCLINED
GRATE
COOLER**
equipped with
**INTEGRAL
CLINKER
BREAKER**

among its many
advantages are

(1) Effective air quenching. (2) Effective heat recovery, because secondary combustion-air passes through the hottest zone of the clinker bed. (3) Fuel savings by highly preheating secondary combustion-air and by raising ignition speed of fuel. (4) High-temperature combustion-air permits low-volatile coal, and coal with high moisture content, to be used. (5) Increase in grindability of clinker. Take advantage of Fuller's long experience in materials handling and cooling. A talk with one of our engineers may lead to more profitable operation.

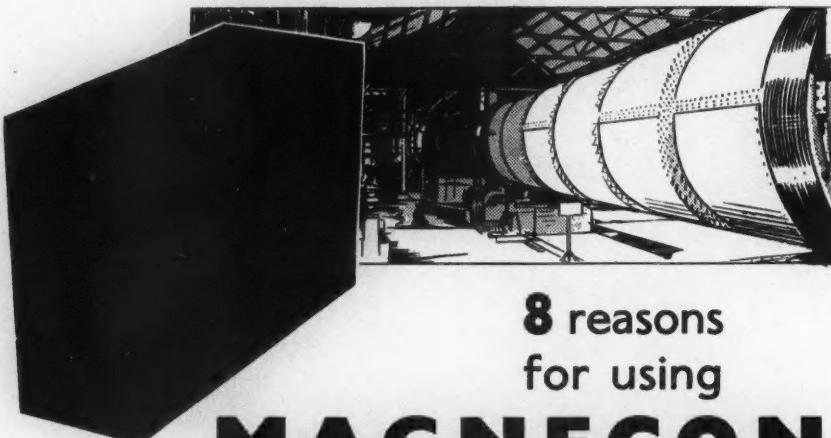


CONSTANTIN (ENGINEERS) LTD.

123 VICTORIA STREET, LONDON, S.W.1

Telephone: TATE GALLERY 0637

(Sole licensees for the manufacture and sale of Fuller equipment in Great Britain)



**8 reasons
for using
MAGNECON
HOT ZONE LININGS
in your rotary Cement Kilns**

Complete
List of
CONSETT
Refractories
on
application

- 1 Are not subject to chemical attack at highest operating temperatures.
- 2 Will withstand kiln shut-downs without spalling.
- 3 Will not disintegrate due to thermal contraction.
- 4 Have better than average hydration resistance.
- 5 Will build up coating very rapidly.
- 6 Are able to maintain coating during operation and during shut-downs.
- 7 Will give increased cement production per lining.
- 8 Will save maintenance time and cost.

MAGNECON is recognised in many Countries as the ideal basic lining for the production of Portland Cement.



TELEPHONES: CONSETT 341 (12 LINES). TELEGRAMS: STEEL, PHONE, CONSETT

DAYLOR CIRCULAR DUST COLLECTORS



The Mechanism shown above is standard and is robustly built
for 24-hours' operation.

J. DARNLEY TAYLOR LTD.

*undertake the design and installation of complete
Dust Collection plants, including
ducting.*

Our machines are extensively used in Packing Plants, Grinding Mills, Screening and Crushing Plants, for the collection of Cement, Gypsum, Lime and Stone dusts, etc.

With many plants already giving first-class performances, our Collectors are sold mainly on reputation and incorporate cyclone and filter sleeve principles, with fully auto-scavenging and rapping cleaning mechanism.

May we help you with your problem? Write to:

NESOR HOUSE, 3 CALEDONIAN ROAD, LONDON, N.1. Telephone: TERminus 9454



Representatives for U.K.: Carruthers Engineering Co. Ltd., The Boultons, London Road, ASECOT, BERKSHIRE





Capacity!



Our exceptional CAPACITY
offers you :-

- ★ Helical, Spur or Bevel Gears up to any size.
- ★ Gears of any weight.
- ★ All the advantages of steel castings, machining and gear cutting in the one factory.
- ★ Inspection facilities commensurate with the production.
- ★ The assurance of modern metallurgical control.

*Large machine cut Double
Helical Gears for colliery winder.*

THE
DAVID BROWN
CORPORATION (SALES) LIMITED
JACKSON DIVISION
SALFORD WORKS HAMPSON STREET
MANCHESTER 5

VISCO-BETH

AUTOMATIC

Dust Collectors

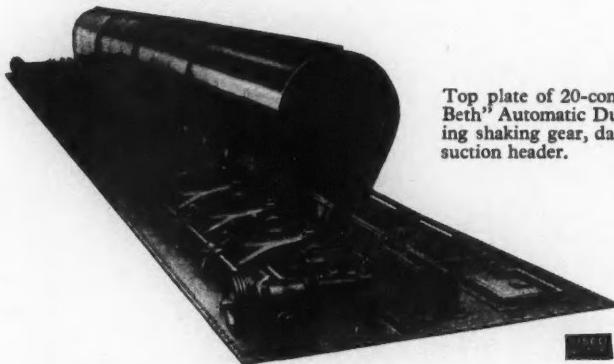
increase output, reduce "costs"

Every year thousands of tons of cement, which otherwise would be lost by becoming airborne, are recovered at cement works having "Visco-Beth" Automatic Dust Collectors.

At a recent test of a "Visco-Beth" Automatic Dust Collector by a large cement organisation, a recovery efficiency of virtually 100% was recorded. This group has over 60 "Visco-Beths" at its various works. Definitely, "Visco-Beth" Automatic Dust Collectors abolish the Dust Nuisance, increase output and lower production costs.

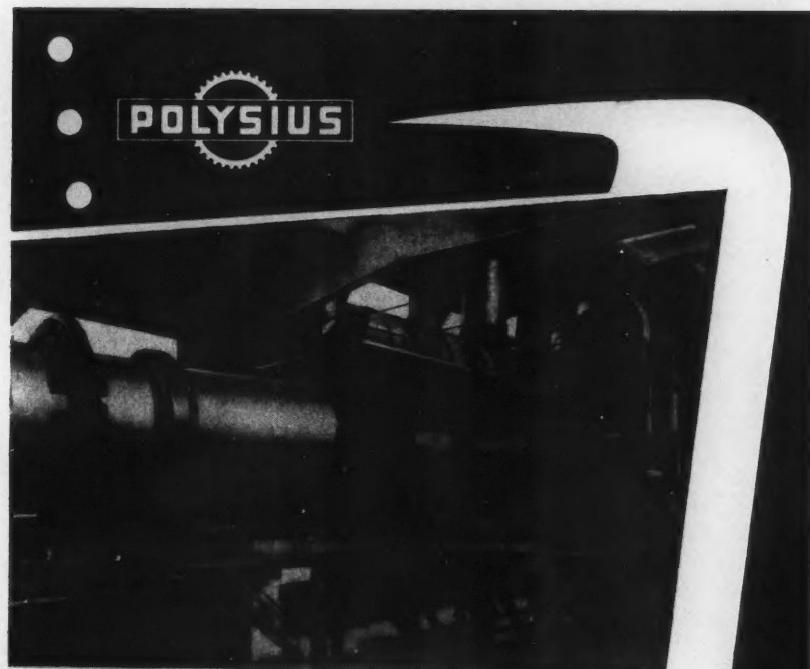
Most important cement works in this country have "Visco-Beth" Automatic Dust Collectors.

*Consult us on your Dust Problem. Write for List No. 532
"Modern Dust Collection & Fume Removal".*



Top plate of 20-compartment "Visco-Beth" Automatic Dust Collector showing shaking gear, dampers and part of suction header.

THE VISCO ENGINEERING CO. LTD., STAFFORD RD., CROYDON
Phone : CROYDON 4181



The „double-pass“ Lepol Kiln
uses only half the coal.

POLYSIUS LTD.
The Brackens, Ascot / Berks.



The amount of air penetrating the bed of the FOLAX GRATE COOLER can be adjusted independently of the amount of air required for the burning in the kiln, and the cooler and kiln speeds are independent of one another.

Other features are efficient heat recuperation, air quenching, effective cooling permitting immediate grinding, low head room, low power consumption and small maintenance cost.

The FOLAX GRATE COOLER—the cooler with horizontal grate and positive conveying of the clinker—is supplied by :

F. L. SMIDTH & CO. LTD.
105, PICCADILLY, LONDON, W.I.

TELEPHONE: GROSVENOR 4100 (17 lines).
TELEGRAMS: POLASMIDTH, TELEX, LONDON.
CABLEGRAMS: POLASMIDTH, LONDON.

More than 1000 factories, mainly cement works, in 65 countries throughout the world are equipped with machinery supplied by F. L. Smidth & Co.

CEMENT AND LIME MANUFACTURE

PUBLISHED ALTERNATE MONTHS.

PRICE 18. A COPY.

ANNUAL SUBSCRIPTION 68. POST FREE.
\$1.30 IN CANADA AND U.S.A.

PUBLISHED BY
CONCRETE PUBLICATIONS LIMITED
14 DARTMOUTH STREET, LONDON, S.W.1.
TELEPHONE: WHITERALL 4581.
TELEGRAPHIC ADDRESS:
CONCRETUS, PARL, LONDON.

PUBLISHERS OF
"CONCRETE & CONSTRUCTIONAL ENGINEERING"
"CONCRETE BUILDING & CONCRETE PRODUCTS"
"CEMENT & LIME MANUFACTURE"
"THE CONCRETE YEAR BOOK"
"CONCRETE SERIES" BOOKS.

VOLUME XXX. NUMBER 3.

MAY, 1957

Vertical Cement Kilns.

THE modern vertical cement kiln has many new features, such as increased capacity, reduced fuel consumption, and uniform quality of clinker. A shaft kiln installation designed for a daily output of 150 metric tons of clinker occupies only 650 sq. ft. of floor space. Another advantage of the shaft kiln is that its operation can be stopped at any time with little trouble.

A low shaft kiln, designed by W. Anselm, of Germany, is shown diagrammatically in Fig. 1. Its main features are the introduction of combustion air in the centre of the charge and the cooling of the clinker in a rapid grate-type cooler. The air required for combustion is supplied under pressure through two pipes, one of which enters the charge at the bottom so that the incoming air helps to reduce the temperature of the clinker before it leaves the kiln. The other pipe

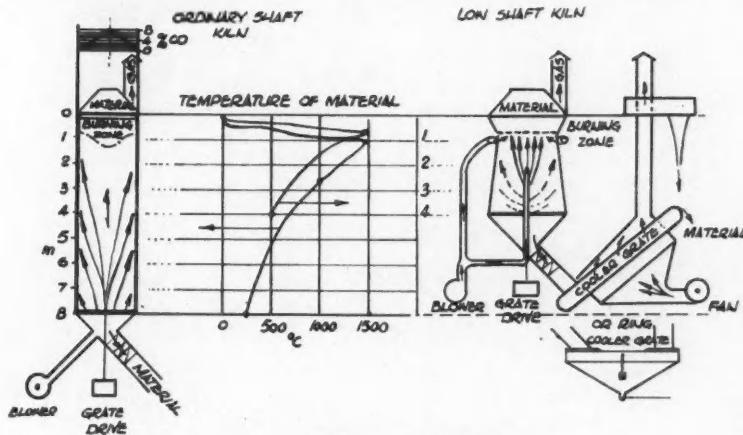


Fig. 1. Ordinary and Low Kilns.

supplies air directly to the burning zone. The temperature of the clinker discharged from the kiln is about 500 deg. C. The clinker is then further cooled on the grate, from which it is discharged at a temperature of about 100 deg. C. A feature of the kiln is the small amount of dust it produces, which is less than 0.5 gramme per cubic metre. The overall thermal efficiency of the kiln is about 45.7 per cent. This kiln, with a diameter of 3.2 metres, has a capacity of about 225 tons of clinker per day.

A Gas-Fired Kiln.

Another kiln, by the same designer, is adapted to use oxygen-enriched air for combustion. The kiln-grate and discharge-gates are power operated, and the kiln may have a daily capacity of about 300 tons of clinker. Instead of using air for combustion a mixture of gases is prepared containing any desired ratio of oxygen to carbon dioxide. The waste gas from the kiln is used for this purpose after it has been cleaned in a wet-gas washer and the dust has been removed in

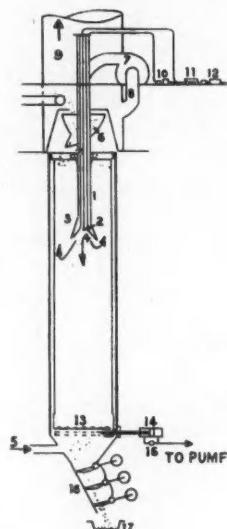


Fig. 2.

1, Chute; 2, Oil-burner; 3, Water Pipes; 4, Vaporizing chamber; 5, Secondary air inlet; 6, Rotating feeder for pellets; 7, Primary air fan; 8, Flue gas pipe; 9, Chimney; 10, Pump; 11, Heat exchanger (oil-water); 12, Oil pump; 13, Discharge grate; 14, Cylinder; 15, Valve; 16, Discharge gates; 17, Conveyor.

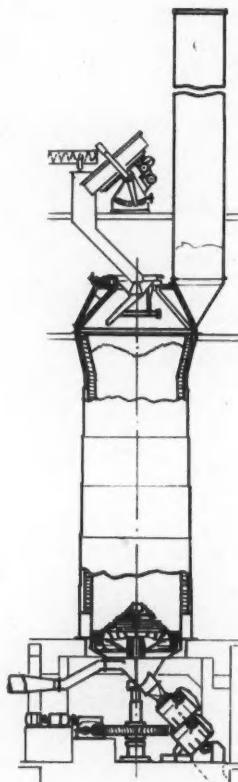


Fig. 3.

cyclones. The capacity of the kiln per cubic metre is up to 6 tons in 24 hours, so that with a height of 10 metres and an internal diameter of 2·5 metres the capacity of a single shaft kiln is equal to that of a rotary kiln 60 metres long.

Tests show that the most suitable mixture of gas is about 40 per cent. oxygen, 40 per cent. carbon dioxide, and 20 per cent. hydrogen. The oxygen used is "tonnage oxygen," produced on a large scale, which contains about 80 per cent. of pure oxygen. The kiln is suitable for fully-automatic operation. Heat consumption, when the proportion of oxygen in the combustion air is 20·9 per cent., is 1100 k./cal. per kg. of clinker when the output is 110 tons per 24 hours. When the amount of oxygen in the combustion air is 40 per cent. the heat consumption is 800 k./cal. per kg. of clinker and the kiln output is 215 tons in 24 hours.



Fig. 4. Weighing Equipment.

Against the advantages of reduced fuel costs, increased output, and improvement in the quality of clinker, there should be set the cost of producing oxygen.

Oil-Fired Kilns.

A diagram of an oil-fired shaft kiln designed by W. Anselm is shown in *Fig. 2*. Only a few kilns of this type are in use; no operating data are available, but development work is being undertaken in several countries as the use of fuel oil is expected to be advantageous.

Coal-Fired Kilns.

In the past few years several shaft kilns made by L. de Roll, S.A. of Zurich, have been installed in various countries. A battery of four such kilns, with pneumatic homogenizing installation and ancillary equipment, has recently been ordered for an American cement works. *Fig. 3* is a diagram of this type of kiln.



Fig. 5. Rear view of Pelletisers.



Fig. 6. Pelletiser.

The coke or anthracite-breeze and the raw meal are first weighed and proportioned on automatic scales (*Fig. 4*) and mixed in a paddle-mixer to a homogeneous mass, which is passed on to a pan-pelletiser where it is formed into nodules, from 10 to 20 mm. diameter, by adding 12 to 14 per cent. of water. The nodules leaving the pelletiser are fed directly to the kiln. The pelletiser (*Figs. 5 and 6*) is an inclined rotating pan in which the water is added to the mixture and nodules of a uniform size are formed. By adjusting the inclination of the pan and its speed of rotation, the size of the nodules can be varied. The



Fig. 7. Discharge Gate and Air Lock.

nodules are strong enough to support the weight of the kiln charge without being crushed, so that the gases can circulate freely in the burning zone.

Coke and anthracite are recommended as the fuel because they contain very little volatile matter and there are no losses due to volatile constituents being distilled off before reaching the burning zone, which would lower the overall efficiency of combustion. The calorific value of the fuel should be as high as possible, preferably 11,700 to 12,600 B.T.U. per lb. and not less than 9900 B.T.U. per lb. (coke having 22 per cent. ash and 10 per cent. moisture content is suitable). The anthracite should contain 6 to 8 per cent. volatile matter, 6 to 15 per cent. ash, and 4 to 6 per cent. moisture; the coke should contain 2 to 4 per cent. volatile matter, 6 to 15 per cent. ash, and 4 to 16 per cent. moisture. The particle size of coke or anthracite coal should not be larger than $\frac{1}{16}$ in., and the proportion smaller than $\frac{3}{4}$ in. should be as low as possible; as much as possible should be

between $\frac{3}{16}$ in. and $\frac{1}{4}$ in. Extremely fine particles increase the quantity of carbon monoxide in the exit gases. A high proportion of particles larger than $\frac{1}{4}$ in. requires an unnecessary increase in the length of the burning zone and results in the clinker being discharged at a higher temperature. The size of the fuel can therefore have a considerable effect on the heat produced from a given quantity of fuel.

The raw material should be ground as finely as practicable, as the finer it is the better the quality of the clinker. The fineness is limited by the high cost of very fine grinding; it is therefore recommended that the raw meal be ground to a residue of 10 to 15 per cent. on B.S. sieve No. 170.

The kiln is charged from a hopper with an adjustable spout. The nodules are distributed uniformly in the kiln and the kiln is kept charged to a constant level and operates continuously. In the enlarged upper part the material is first dried and then falls slowly to the narrower part. Decarbonation takes place at about 950 deg. and the final burning of the clinker at 1450 deg. C. The nodules keep their shape very well as they pass through the kiln, thus helping to maintain a uniform distribution of gas throughout the whole cross section, and the burning zone stays at a fixed level. The clinker is cooled in the lower part of the kiln before it reaches the discharging grate.

The clinker is discharged through a rotary grate and a gate with a triple air lock (Fig. 7). By adjusting the speed of rotation of the grate the amount of clinker discharged, and thus the rate of burning, can be controlled. The average fuel consumption stated by the manufacturers is 950 to 1,000 k/cal. per kg. of clinker with a power consumption of 12 to 14 kWh. per ton for the whole installation, including the blower.

Congress of Chemical Engineering 1958.

The European Congress of Chemical Engineering 1958 is to be held in conjunction with the ACHEMA Congress at Frankfurt-am-Main from May 31 to June 8, 1958. Further information can be obtained from DECHEMA, Frankfurt-am-Main 7, Postfach, Germany.

Cement Works in Peru.

A contract valued at 87,000,000 soles has been placed with a Danish firm for the supply of machinery and plant for a new cement works to be built at Caracoto, in southern Peru. The factory will have a capacity of about 60,000 tons a year.

The Cement Industry in Ceylon.

The output of the cement works at Kankesanturaia in the year ended September 30, 1956, was 87,000 tons, an increase of 10,000 tons on the previous year.

Cement Production in Finland.

The production of Portland cement in Finland in 1956 exceeded a million tons. This is the highest production on record.

Hardening of Cement in Cold Weather.

ENGINEERS from many countries where concreting has to be carried on at low temperatures attended a symposium on Winter Concreting held in Copenhagen last year under the auspices of the Danish National Institute of Building Research, and presented the results of their experience in overcoming this problem. Research workers also attended and described the results of laboratory investigations on the effect of low temperatures on the properties and rate of hardening of cements. These papers have now been published in a volume* of 1574 pages, which includes the contributions to the discussions which followed the papers. The volume is printed in the English language, and includes an extensive summary of the main conclusions in English, French, and German. Among the papers presented and contributions to the discussions published in this volume are.

WEATHER IN RELATION TO WINTER CONCRETING: Temperature-variations in Sweden in relation to tests of resistance to freezing, by Hans A. Vinberg. Calculation of the influence of the weather on concrete, by Jørn Jessing. Winter concreting in Poland, by M. Rzędowski. Contributions by J. G. Buitink, F. N. Sparkes, and E. G. Suenson.

LABORATORY EXPERIMENTS ON THE DETERMINATION OF THE RESISTANCE OF CONCRETE TO EARLY FREEZING: General Report, by Inge Lyse. Resistance to early front action, by Göran Möller. Cold-weather concreting with high-early-strength cement, by Ernst Gruenwald. Effect of freezing on strength and expansion, by Arvo Nykänen. Tests of concrete at a temperature of 20 deg. F. (-6.7 deg. C.), and Effect of entrained air and calcium chloride, by Lewis H. Tuthill. Freezing and thawing tests on green concrete, by Poul Nerenst and Niels Munk Plum. The influence of alcohol on concrete in cold weather, by Erik V. Meyer. Contributions by G. Möller, P. Lhopitalier, G. Wastlund, T. C. Powers, K. Schaden, A. Klein, and I. Lyse.

EFFECT OF TEMPERATURE ON THE HARDENING OF CONCRETE: General Report by the Swedish Cement and Concrete Institute. Curing by electric heating, by K. Horimatsu. Computation of times for removing formwork, by Hans A. Vinberg. Effect of temperature on the heat of hydration, by E. Rastrup. Hardening at different temperatures, especially below freezing point, by Arvo Nykänen. Effect of initial curing on strength, by T. Takahashi and M. Hayashi. Effect of low temperature curing on compressive strength, by J. D. McIntosh. Hardening at different temperatures, by C. J. Bernhardt. The heat of hydration of cement, by U. Danielsson. Winter concreting in the Soviet Union, by S. A. Milonov. The use of the "Maturity"-function in assessing the sensitivity of cements to low temperatures, by W. Brand. Hydration of cement as a function of temperature, by E. Rastrup. Contributions by E. Rastrup, P. Häkansson, W. Czernin, S. G. Bergström, T. N. W. Akroyd, M. Rzędowski, E. Lewicki, A. Klein, H. Granholm, and G. Wästlund.

* "RILEM Symposium on Winter Concreting". Obtainable from Concrete Publications, Ltd. Price 65s. (by post 67s.); \$12.50 in North America.

RESISTANCE TO FROST AT EARLY AGES: General Report, by T. C. Powers. Influence of the age of concrete before exposure to freezing on strengths beyond 21 days, by J. Blondel. Computation of resistance to freezing at early ages, by P. Nerenst. Effect of air entraining in cold weather, by V. V. Stolnikov. Evidences of disintegration of concrete affected by freezing and thawing, by Ervin Poulsen and G. M. Idorn. Contributions by T. C. Powers and W. Czernin.

ENSURING HIGH-QUALITY CONCRETE IN WINTER: General Report, by A. Voellmy. Television tower at Stuttgart—a steel-concrete structure built in cold weather, by E. Bachus. Influence of heated mixing water on properties of concrete and heat of hydration of cement, by Hideo Yokomichi. Electrical curing in cold weather, by Yasuo Ichiki. Setting temperatures at air-temperature below freezing, by Chr. F. Grøner. Temperatures maintained by insulation, by Lewis H. Tuthill. Classification of durability according to resistance to frost, by S. V. Shestoporov. Heat treatment by steam at atmospheric pressure, by K. Thiel. The use of chloride salts, by S. A. Mironov and B. A. Krylov. Contributions by I. Grzymek, M. Kohn, P. Haller, F. Scheidegger, Inge Lyse, K. Böhmer, W. Grün, A. Lazard, A. Voellmy, J. Jamboř, H. Rüsch, J. D. McIntosh, F. Hess, and A. Staub.

CONSTRUCTION PROCEDURE IN COLD WEATHER: Winter concreting in Finland, by Beato Kelopuu. Winter concreting in Holland, by J. G. Buitink and J. M. L. Trouw. Construction of houses and multiple story buildings in cold weather, by Arvo Nykänen. Use of ready mixed concrete in winter, by Folmer Jørgensen. Winter concreting in China, by L. S. Wu. The hardening of concrete in frost, by V. N. Sizov. Electrical heating of massive structures such as dams, by K. V. Alexeyev. Contributions by H. Rühle, J. J. Bouvy, K. Schaden, J. Talbierski, A. Klein, and F. W. Katlein.

Research on Cement in France.

A conference is to be held in Paris on June 3 and 4 to commemorate the tenth anniversary of the foundation of the Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques. The meetings will be presided over by M. Albert Caquot, and papers will be presented by H. Lafuma (France), A. Allan Bates (U.S.A.), A. R. Collins (Great Britain), R. Dutron (Belgium), Fr. Keil (Germany), Donovan Werner (Sweden), W. Czernin (Austria), and Ed. Torroja (Spain). There will also be a visit to the laboratories of the Centre. Further information may be had from the Centre at 197 Boulevard Saint-Germain, Paris VII, France.

Production of Cement in Mexico.

The production of cement in Mexico in the year 1956 was 2,276,660 tons, compared with 2,085,652 tons in 1955.

Cement Production in Nicaragua.

The production of cement in Nicaragua in the year 1955 was 24,600 tons, compared with 22,500 tons in 1954.

Proposed International Standard for Testing Cement.

THE Swedish Cement Statistical and Technical Association, known as Cembureau, has for some years studied the question of promoting international standards for cement with the object of securing uniformity in requirements throughout the world. The Association in 1949 appointed a "working party," on which twelve nations are represented. Most of the experimental work has been on tests for strength, but other properties have also been investigated. On many questions the party has arrived at more or less definite conclusions, but some problems are yet unsolved. The report gives information on what has been agreed upon, and the position of the work still in progress. The following are among the agreed recommendations.

Additions of other materials not exceeding 1 per cent. may be interground with Portland cement clinker at the option of the manufacturer, provided that such additions will not be harmful.

Supersulphated cement is the product obtained from a mixture of granulated blastfurnace slag, calcium sulphate, and a catalyst which may be lime, clinker, or cement, provided that (a) the proportion of SO_3 in the mixture exceeds 5 per cent., and (b) the proportion of catalyst in the mixture does not exceed 5 per cent.

As few restrictions as possible should be imposed on chemical composition, and no general rules should be laid down. A content in Portland cement of 5 per cent. MgO is considered safe in all cases. No decision has been reached on the allowable sulphate content, but a tentative figure of 3·5 per cent. has been suggested. Concrete generally shrinks when drying, and for that reason slight expansion due to sulphate action should not be harmful. No case was known to the committee where damage due to too high a proportion of sulphate had occurred.

The Le Chatelier test for soundness and the Vicat method for setting-time are considered to be satisfactory and are recommended.

It is not necessary to limit the fineness of cement. Nevertheless, it is advisable to have standard methods for assessing the fineness if that is required. For routine purposes the sieve residue should be determined as well as the specific surface. For determining specific surface, air-permeability methods are preferred, and the Lea-Nurse apparatus is recommended because it can easily be calibrated directly. The modification by Blaine is recommended for routine purposes; it is simpler to use and can be calibrated against the Lea-Nurse apparatus. The Andreasen method is best for assessing particle-size distribution, and is recommended for research work.

It would seem desirable to develop a method relating the strength of cement to the strength of concrete, that is a concrete test. This, however, requires more work than a mortar test, and it appears to be more difficult to standardize aggregates for concrete than for mortar. The committee concluded that in the first place a mortar test was most likely to be agreed upon and should be developed, and that a concrete test should be regarded as reference test.

Proposed Mortar Test.

The proposed mortar test is described in full, and an account is given of the tests made in different countries before deciding on this procedure. The main characteristics of the mortar are based on the following considerations. (1) Except in the case of special high-strength concrete made with a low water-cement ratio, concrete generally has relatively high water content, and has strengths and rates of hardening different from those of the "dry" mortars still in use in the specifications of many countries. (2) Plastic mortar has a rate of hardening more like that of concrete and the relation between the strength of concrete and the strength of mortar varies less with age for a plastic than for a "dry" mortar. Plastic mortar consequently is an advantage even though it may not permit an exact prediction of the strength of a concrete mixture. (3) The mortar should have sufficient plasticity for easy moulding, thus reducing the influence of the operator; it should also be able to retain water sufficiently to minimise "bleeding." These requirements could be met by a high cement-sand ratio in the mortar. The proportions 1:3 are generally used, however, and the committee considered that it does not favour a new departure. (4) In most countries the standard sand used has a narrow range of particle sizes, and this does not produce the required plasticity. In other countries the sands used are composed of several fractions of different sizes, and this latter type of sand has been accepted by the committee. (5) The committee has found it desirable to adopt a constant percentage of water in the mortar rather than to vary it according to the quantity required to give a cement paste of normal consistency. This quantity varies with different operators and, by fixing the amount of gauging water, a source of variation is avoided. (6) The composition of the mortar, its moulding, and the test to which it is submitted, should be such that the results obtained are consistent and reproducible. The committee recommends that the tensile test on 8-shaped specimens be discarded and replaced with a bending test. The size of the specimens proposed is that which Feret recommended long ago and which several countries have already adopted, that is 4-cm. by 4-cm. by 16-cm. prisms.

Tests on Concrete.

Tests on concrete have been made because they constitute the first step in developing a mortar test having the best correlation with concrete. The development of a concrete test suitable as an acceptance test in specifications had earlier not been considered practical, chiefly because of the difficulties anticipated in defining the nature of the aggregate. However, the Associated Portland Cement Manufacturers, Ltd., of Great Britain, suggested a concrete test in which any aggregate could be used provided that the amounts of cement and water in a specimen were exactly correct, the concrete was reasonably workable and had a slump between $\frac{1}{2}$ in. and 2 in., and the aggregate had sufficiently high strength and low water absorption. This test is about to be introduced into the British Standard Specification for Cement. In its original form it was used by the Associ-

ated Portland Cement Manufacturers, Ltd., for internal use but not in a form suitable for a standard specification. The method was revised and tested by the committee in 1952, and it was further revised and retested in 1953. The results of these tests gave sufficient confidence to propose it as a British Standard. It was then tested by the British cement industry and two British Government laboratories. This was followed by further tests at more than twenty laboratories in England and one in South Africa. This is an example of a standard test produced by an international organisation being accepted in a national specification, and it is believed that it is the first time that such an action has been taken.

The report, entitled "On the Testing of Cement," is obtainable from Cembureau, P.O. Box 245, Malmö, Sweden (price 10s.).

Production of Cement in Turkey.

In the year 1956 the production of cement in Turkey was 970,000 tons and 291,000 tons were imported. It is expected that in the year 1957 the production will be nearly 2,000,000 tons, and in the following year 2,500,000 tons.

Lime Production in Rhodesia.

A new lime works has been opened at Colleen Bawn by Rhodesia Cement, Ltd. The vertical kiln is expected to produce 1,000 pockets of hydrated lime per day. Cement-lime mixtures are also to be produced.

Cement Production in France.

The production of cement in France in the year 1956 was 11,200,000 tons; this was an increase of 6 per cent. compared with the previous year.

Cement Production in Lebanon.

The production of cement in Lebanon in the year 1956 was 487,527 tons.

The Cement Industry in Peru.

Until the year 1955, when a new cement works was built near Lima, the only cement works in Peru was that near Lima of Compania Peruana de Cemento Portland S.A. Two other cement works are now nearing completion in northern Peru, another is being built in the central area of the country, a contract has been signed for the construction of another cement works in southern Peru, and there is a possibility of another works being built in the east and another in the south.

The Cement Industry in Madagascar.

An agreement has been made for the re-opening of the cement works at Amboania, which was closed six years ago. The estimated production is 150 tons a day.

An Electronographic Study of Silicate Hydrates.

THE following is abstracted from a report entitled "An Electronographic Study of the Morphology and Crystallization Properties of Calcium Silicate Hydrates," by A. Grudemo (Proceedings No. 26 of the Swedish Cement and Concrete Research Institute. Price Kr. 15).

It is generally accepted that among the various compounds formed during the reaction between Portland cement and water the calcium silicate hydrates play the dominating part in determining the physical properties and the development of mechanical strength during the setting of the cement gel. The nature of the cementing action would be better understood if detailed knowledge were available about the internal microstructure of the calcium silicate hydrates. Since, however,

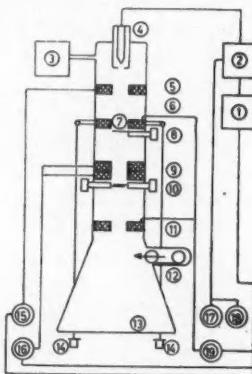


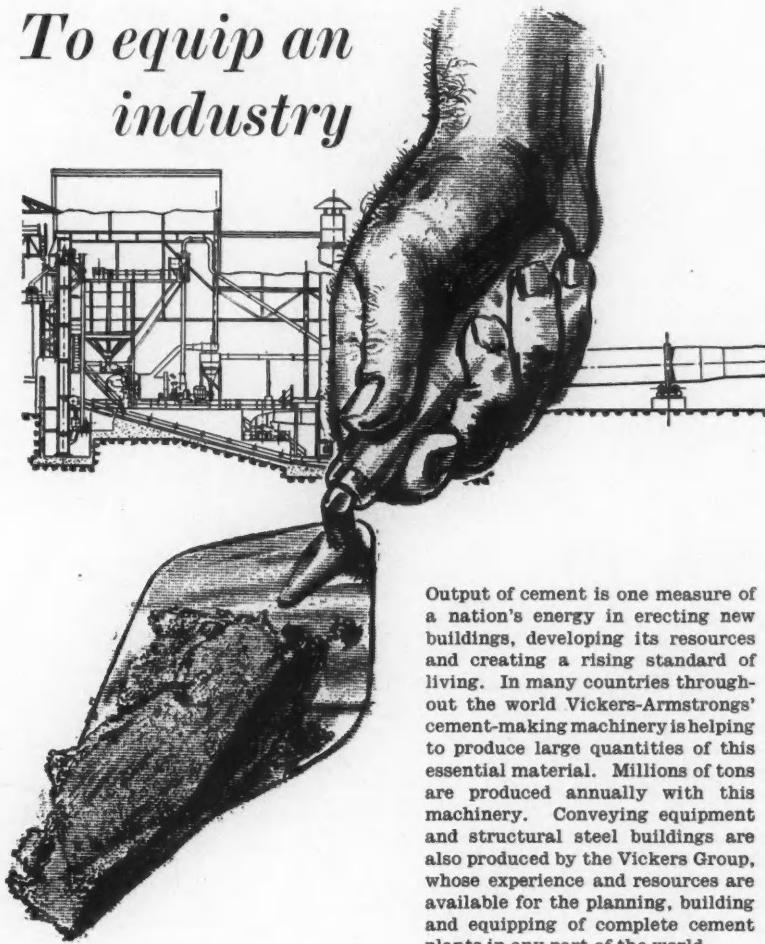
Fig. 1.

(1) Power supply and electronic equipment. (2) High-voltage transformer and rectifier. (3) Vacuum equipment. (4) Electron gun. (5) Condenser lens. (6) Objective lens. (7) Specimen probe and air-lock. (8) Exchangeable objective apertures. (9) Intermediate and diffraction lenses. (10) Diffraction aperture. (11) Projector lens. (12) Camera. (13) Fluorescent screen. (14) Levers for specimen movement. (15) Condenser control. (16) Magnification control. (17) Electron-beam intensity control. (18) High-voltage selector. (19) Focus control.

the crystals of these compounds are of submicroscopic or colloidal dimensions, ordinary light microscopy is generally inadequate. It might be assumed that size, shape, and aggregation properties of the solid particles are important factors in the formation of gel. The most suitable experimental method capable of providing new information about these properties seems to be electron microscopy, preferably in combination with electron diffraction. The studies described in this paper were started in 1950, since when a considerable amount of experimental material has been collected.

A three-stage Phillip's microscope (*Fig. 1*) was used. The lenses and controls are arranged so that the objective and projector lenses represent a fixed magnification (about 6,000 on the fluorescent screen, four times less on the photographic microfilm record), while the intermediate lens and the diffraction lens are used alternatively to change the magnification continuously from the fixed value up to about 80,000 times (the intermediate lens) or down to zero (the diffraction lens),

To equip an industry



Output of cement is one measure of a nation's energy in erecting new buildings, developing its resources and creating a rising standard of living. In many countries throughout the world Vickers-Armstrongs' cement-making machinery is helping to produce large quantities of this essential material. Millions of tons are produced annually with this machinery. Conveying equipment and structural steel buildings are also produced by the Vickers Group, whose experience and resources are available for the planning, building and equipping of complete cement plants in any part of the world.

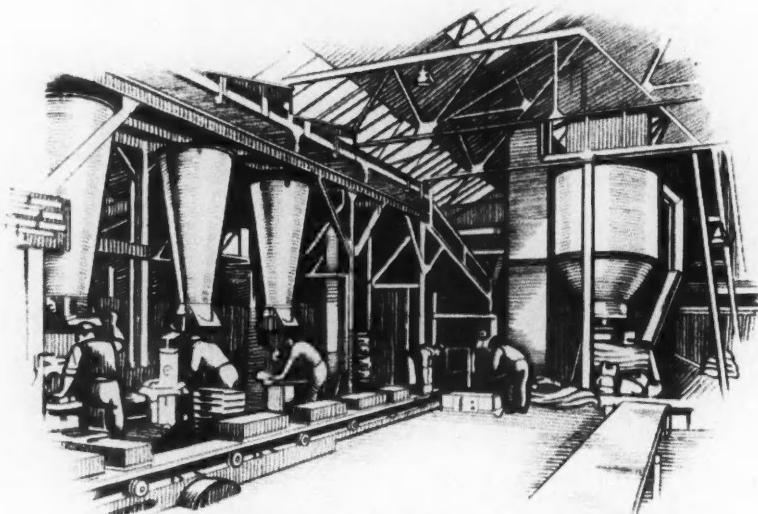
VICKERS-ARMSTRONGS

Vickers-Armstrongs (Engineers) Limited, Vickers House, Broadway, London, SW1

TGA BTE262

Balls & Pellets

Manufactured in hard white "WYCHRO" iron, giving extremely good wearing qualities, these are widely used by manufacturers of cement and paint at home and abroad. Any size ball or pellet can be made to customer's specification. Please send for our illustrated folder.



Our highly mechanised plant has been specially installed for the production of grinding media and mill linings.

Wye Foundry
COMPANY · LIMITED
WILLENHALL
S T A F F S

the last value representing the position of the electron diffraction. The most frequently-employed magnification for the photographic film is 5,000. As the resolution of the film is about ten times that of the human eye, the micrographs may subsequently be enlarged on positive prints up to ten times without appreciable loss in sharpness.

If an object is placed in the normal position (near the first focal plane of the objective lens) a diffraction diagram is formed as a "primary image" in the second focal plane of the objective. Although the diffraction image is very small, with a diameter of about 1 mm., most of its peripheral parts are cut off by the small objective aperture used to obtain good contrast in a normal microscope. If this aperture is changed for one of much larger diameter, an enlarged image of the diffraction diagram can be projected on to the screen by the combined action of the diffraction and projector lenses, with the diffraction lens current in the zero position.

The materials examined were obtained from various sources and by different methods. Some were obtained by mixing lime, silica, and water during ultrasonic treatment, or by hydration of C_3S by means of ultrasonic vibration or shaking for a long period. Other materials were obtained by adding ethyl orthosilicate to lime solutions, or by the slow hydrolysis of an ethyl orthosilicate layer on the surface of a solution of lime. Other reference materials and clay minerals were included for a comparison with the possible crystal habits and distortions of silicates with layer lattices.

The conclusions reached were as follows. Generally the various C—S—H products studied showed a considerable diversity of shapes and sizes of crystals, homogeneity, aggregation, etc., and no two products seemed to be exactly alike in these respects. It was observed that the most commonly-appearing low-temperature C—S—H compound, namely, CSH(B), may in favourable circumstances develop large crystal layers, although superposition of layers seems to be less common than in clays on account of the greater flexibility and ease of distortion of the layers. In saturated and supersaturated solutions of lime, however, a fibrous or needle-like growth of crystals seems to be promoted, probably caused by degeneration of the sheets into lath-like structures and by twisting or rolling of the crystal sheets. It is likely that aggregates of such structural elements are common in a setting cement gel, where they probably play a major part in determining the mechanical properties of the paste. However, as numerous examples show, the aggregation and interlacing of fibrous particles, as well as the interaction between fibres and other types of particles present, may proceed in many different ways depending on the conditions. In practice, the crystallisation processes are further complicated by the presence of other constituents, such as aluminate, ferrite, alkali, and sulphate ions, which may influence the crystalline properties and the microstructure of the C—S—H compounds.

The results of this investigation generally agree with the commonly accepted ideas of the morphological structure of cement gel as described by Professor J. D. Bernal at the Third International Symposium on Cement held in London in 1952.

High-Alumina Cement.

Patent Application No. 747,016, in the name of Messrs. Albright & Wilson Ltd., relates to a process for producing a high-alumina material for grinding to a cement. This process comprises reducing a phosphorous containing mineral mixture to form phosphorous and a slag containing aluminium, calcium, and silicon wherein the ratio alumina to calcia is between 0·5 and 1·85 and silica is up to 10 per cent. and contains less than 3·5 per cent. fluorine when the silica is less than 5 per cent., or less than 2·5 per cent. fluorine when the silica is 5 to 10 per cent. The slag is retained in a molten and quiescent state for a time sufficient to allow separation of iron phosphide. The mineral mixture may be a naturally occurring *a*-aluminium phosphate of low fluorine content, or *b*-aluminium calcium phosphate, or bauxite or alumina together with a naturally occurring calcium phosphate or defluorinated fluorapatite and bauxite.

MISCELLANEOUS ADVERTISEMENTS

SCALE OF CHARGES

Situations Wanted, 3d. a word; minimum 7s. 6d. *Situations Vacant*, 4d. a word; minimum 10s. Box number 1s. extra. *Other miscellaneous advertisements*, 4d. a word; 10s. minimum. Advertisements must reach this office by the 5th of the month of publication.

SITUATIONS VACANT

CEMENT WORKS MANAGERS

SITUATIONS VACANT. Applications are invited by the Foreign Office for two posts as CEMENT FACTORY MANAGER in Iraq, one at Surchinar near Sulaimaniyah and one at Mosul, the former to be filled immediately, the latter in 1958. Will be required to take charge of factory, producing at commencement 350 tons of Portland and low heat cement daily and ultimately 1,000 tons per day. Must have considerable experience of cement factory management. Salary 300 to 350 Iraqi dinars per month according to qualifications and experience (one D.I. = £1), plus high cost-of-living allowance. Duration up to two years initially. For further information and application forms write Ministry of Labour and National Service (E.9), Almack House, King Street, London, S.W.1, quoting A12/IRQ/ME/173.

fans for heavy duties

Regardless of size — no matter what type—if it's a fan for use in the Cement Industry contact Keith Blackman.

Fans for KILN DRAUGHT
SECONDARY AIR
CLINKER COOLING
DUST REMOVAL
KILN COAL FIRING
SACK CLEANING
CONVEYING
BOILER DRAUGHT
VENTILATING

Write for the fully illustrated Booklet No. 25/31

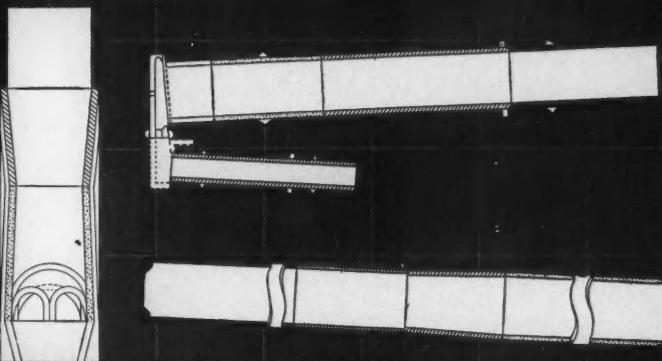
Keith Blackman Ltd

MILL MEAD ROAD LONDON N17



T.A. 7224 608

**FOR LONGER LIFE
& MINIMUM MAINTENANCE**



Specify
DAVISON **HIGH ALUMINA
AND FIRECLAY REFRactories**

ALUMANTINE

High Alumina refractories for use at high temperatures under conditions of severe chemical attack and mechanical abrasion. Four grades 40/45%, 53/58%, 60/65% and 70/73% Al_2O_3 .

HYSILYN

Tough textured general purpose firebrick, resistant to chemical attack and abrasion.

ADAMANTINE

This firebrick is designed for use at temperatures not exceeding 1100 C. Particularly resistant to potash salts and gives outstanding service in furnaces consuming alkali-rich fuels like bagasse, etc.

Write for brochure containing full technical description

GENERAL REFRACTORIES LIMITED

GENEFAX HOUSE • SHEFFIELD 10 • Telephone: SHEFFIELD 31113
347





The photograph shows one of the two 355 ft. Edgar Allen rotary kilns supplied, with much other equipment, to the United Sulphuric Acid Plant at Widnes. The kilns, fired by pulverised coal, produce a clinker composed of alumino-ferrite and silicates of calcium. The kiln gases, after being cooled and cleaned, are converted into sulphuric acid.

This is but one of the Edgar Allen contributions to the world's chemical processing. Write for literature. We manufacture rotary kilns, industrial drying plant, tube mills, ball mills, crushers, pulverisers, cement and lime-making plant, etc.

Edgar Allen & Co. Limited
IMPERIAL STEEL WORKS · SHEFFIELD · 9

For this Booklet post the coupon to-day

To EDGAR ALLEN & CO. LTD. ED 29/MQE
SHEFFIELD 9

Please send details of Edgar Allen Rotary Kilns to:

Name

Position

Firm

Address

